REMARKS/ARGUMENTS

Claims Status

Claims 1-25 remain in this application. Claims 10 and 23 have been amended. Claims 1-9 and 18-23 have been withdrawn as a result of an earlier restriction requirement. In view of the examiner's earlier restriction requirement, applicant retains the right to present claims 1-9 and 18-21 in a divisional application.

Claims 10-12, 15, 16 24 and 25 stand rejected under 35 USC 102(e) as being anticipated by US Patent Publication 2003/0180692 (Finn).

The Examiner stated (pg. 3 of the Office Action) that in the Finn reference "A predetermined re-producible pattern is used to texture the electrolyte sheet". However, the Finn reference was previously reviewed by the Examiner, and the previous 102 rejection (anticipation by Finn) was withdrawn by the Examiner. More specifically in the Office Action dated 3/22/06, pg. 5 (Response to Arguments), the Examiner stated "Applicants arguments, filed 11/21/05 with respect to rejection(s) of claim(s) under Finn have been fully considered and are persuasive. Therefore, the rejection has been withdrawn."

More specifically, in the previous response(s) Applicants showed that the Finn reference does not disclose the combination of ranges claimed by Applicants claims. Since this claim element(s) is still not met, whether or not the Finn pattern is reproducible is moot. The additional claim component (the word "re-producible") will not make Finn an anticipatory reference if it was not an anticipatory reference when this word was absent from the claim.

Claims 10-16 and 23-25 are rejected under 35 USC 103(a) as being unpatentable over US Patent Publication 2001/0044043 (Badding) in view of 2003/0180692 (Finn).

I. Claims 23-24 call for the **electrolyte sheet** with ohmic resistance of no more than 0.5 ohms-cm^2. Applicants found that the only reference to ohmic resistance of an element is the paragraph [0035] of the Badding reference. Paragraph [0035] of the Badding reference disclose the **electrode** resistance (i.e., the resistance of anode and cathode), not that of electrolyte. Thus, the Badding reference is silent with regard to the ohmic resistance of the electrolyte sheet.

The Finn publication also does not describe this feature. Accordingly, because the cited references, in combination, do not disclose all of the claimed features of claims 23-24, these claims are not obvious over the cited references.

Ohmic resistance is a function of the electrolyte's thickness and its thickness variation. Applicants' claim a very low ohmic resistance, which imply that the ratios of thickness variation and the average electrolyte thickness is outside that known in the art. The Finn reference does not teaches the ohmic resistance called for the Applicant nor suggests that the electrolyte sheet geometry should (or can be) optimised to provide low ohmic resistance. The Badding reference also does not disclose ohmic resistance of electrolyte sheets. Therefore, absent a specific teaching of the ranges in the ratio of electrolyte sheet thickness relative to the thickness variation, or an example of such a device, or a teaching that calls for optimization (minimization) of ohmic resistance through specific parameters of the electrolyte sheet, in the cited art itself, one can not assume that the devices described in the cited references, either singly or in combination, would have this ohmic resistance.

II. With regard to claims 10-16 and 25, the Examiner stated that Finn teaches texturing the electrolyte by 5% of its average thickness. Applicants claimed that thickness variation is 6.6% to 90% of the average electrolyte sheet thickness (see, for example, claim 10), which is outside the range taught by Finn. The Examiner stated that "While the 5% is not within the claimed range, claims that differ from the prior art only by slightly different (non-overlapping ranges are prima facia obvious without showing that the claimed range achieves unexpected results relative to the prior art". However, for the following reasons, Applicants' claimed ranges are not "only slightly different", but significantly different by those disclosed by Finn (and by Badding).

Claim 10 calls for an electrolyte sheet with a thickness of 3 μm to 30 μm. The less than 5% variation in the thickness of the electrolyte sheet having a maximum thickness of 30 μm will result in a maximum thickness variation of less than 1.5 μm, not a minimum of 2 μm claimed by Applicants. That is, Applicant's minimum is 33% higher than the maximum taught in the cited art (2 μm- 1.5 μm=0.5 μm, which is 33% of 1.5 μm).

Thus, because Applicants minimum claimed thickness variation is 33% higher than the maximum range taught by the Finn reference, Applicants' claimed ranges are not "only slightly different", but significantly different by those disclosed by Finn.

Similarly, the Badding reference teaches that the disclosed interface layer has a roughened surface which is provided by "applying rough nano-crystaline surface layers to opposite surfaces of the electrolyte". That is, the disclosed surface variation, required to achieve the purpose of the Badding reference is measured in nanometers, and is not "of at least 2 micrometers" as claimed in claim 10. (A nanometer is 10^{-9} m, or 0.01 μm). Thus, the thickness variation of Badding is MUCH smaller than the claimed 6.6% to 90% of the average electrolyte sheet thickness.

Morever, the claimed thickness variation, on the very thin sheets (for example, 30 μm or less, as claimed in claim 10, or 15 μm or less as claimed in claims 13 and 14) is outside the range that those of skill in the art would practice in, because of the concern that such thin SOFC electrolyte sheets would puncture, perforate or fracture during the texturing process (e.g., roughening, sanding), or fracture under stress. Furthermore, as explained in a previous Office Action (filed 10-31-06) the Finn reference teaches away from the Applicant's invention. The Finn reference specifically teaches that thickness variations are less than 5%, and more preferably less than 1% of the electrolyte sheet thickness. This was done to improve surface adhesion for SOFC electrolytes. However, Applicants are claiming larger ratio of surface variations (up to 90 %), which is outside the range disclosed by the cited reference, because they are also improving electrolyte sheet's ohmic resistance- which is a new and different result not taught or suggested by the Finn reference.

The Office Action stated that the claimed ranges, which do not overlap prior art ranges, are unpatentable, unless they produced a new and different result, which is different in kind and not merely in degree from the Prior Art (MPEP 2144.08). Applicants produced such new result.

Applicants are solving a different problem and produce a different result-they are reducing the electrolyte sheet's ohmic resistance, while simultaneously improving its adherence to electrodes. They achieve it by operating in a different regime, than that required by the cited reference(s). Accordingly, claims 10-16 and 23-24 are not obvious over the Finn and Badding references.

Applicants' purpose was different from that of Finn and Badding. Applicants tried to improve the ohmic resistance of the electrolyte sheet, while improving the surface adhesion between the solid oxide electrolyte sheet and its electrodes. Thus, applicants departed from the nano crystalline layer of Badding and instead claimed an electrolyte

sheet surface with a thickness variation of at least 2 micrometers and relatively large surface variation of 6.6% to 90% of the average electrolyte sheet thickness. The Finn reference teaches away from the Applicant's invention. The Finn reference specifically teaches that thickness variations are less than 5%, and more preferably less than 1% of the electrolyte sheet thickness. This was done to improve surface adhesion for SOFC electrolytes. However, Applicants are claiming larger ratio of surface variations (up to 90 %), which is outside the range disclosed by the cited reference, because they are also improving electrolyte sheet's ohmic resistance- which is a new and different result not taught or suggested by the Finn reference.

It is noted that the establishment of *prima facie* case of obviousness required that **all of the elements be found in the prior art**. Accordingly, it follows that if **a single element is not found in cited art**, a valid prima facie case can not be established.

Accordingly, because the Finn reference, alone or in combination with other cited references, do not disclose all of the features of claims 10-16 and 23-25, nor suggests the modification, these claims are patentable over the Finn reference.

Claims 13 and 14 are rejected under 35 USC 103(a) as being unpatentable over 2003/0180692 (Finn).

Claims 13 and 14 depend from claim 10 as their base claim, and therefore, are patentable, for the reasons described above. In addition, claims 13 and 14 call for the electrolyte sheet thickness of 4-15 μm, and 8-15 μm, respectively, while still requiring a thickness variation of at least 2 μm, and calling for the thickness variation of 6.6% to 90% of the average electrolyte sheet thickness. As described above, the Finn reference specifically teaches that thickness variations are less than 5%, and more preferably less than 1% of the electrolyte sheet thickness. Thus, according to Finn, a 15 μm thick electrolyte sheet with less than 5% thickness variation would have thickness variation of less than 0.75 μm, not at least 2 μm claimed by the Applicants. The at least 2 μm

thickness variation claimed by the Applicants is more than 100% different than the 0.75 μm thickness variation. (Please note that 200% of 0.75 μm is 1.5 μm, which is still much smaller than the minimum claimed thickness variation of 2 μm.) This is not a "slightly different" non-overlapping range. Accordingly, claims 13 and 14 are not obvious over Finn.

Conclusion

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Svetlana Z. Short at 607-974-0412.

Respectfully submitted,

DATE: 7/19/07

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